Extension Series:—"Insect Life," by F. W. Theobald, illustrated.

In Mr. Edward Arnold's list we find:—"Psychology for Teachers," by Prof. C. Lloyd Morgan; "Systematic Science Teaching," by Edward G. Howe.

The S.P.C.K. announce:—"Edible and Poisonous Mushrooms: what to eat and what to avoid," by Dr. M. C. Cooke, with eighteen coloured plates illustrating forty-eight species.

Messrs. G. P. Putnam's Sons will issue:—"Diagnosis, Differential Diagnosis, and Treatment of Diseases of the Eye," by Dr. A. E. Adams.

Messrs. W. B. Whittingham and Co. give notice of a book entitled "What is Heat?—a Peep into Nature's most Hidden Secrets," by Frederick Hovenden.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

MAJOR CRAIGIE, the Director of the Statistical Department of the Board of Agriculture, has presented a report on the distribution of grants for agricultural education in Great Britain in the financial year 1893–94. From a summary in the *Times*, it appears that out of the total vote of £8000 entrusted to the Board of Agriculture for educational purposes the necessary provision had been made for the cost of inspection, and the sum of £7450, which remained available, had been applied in the form of specific grants, a small sum being devoted to the reproduction of the records of the Rothamsted experiments for the past fifty years. The Board had been confirmed by further experience in their estimate of the value of establishing fully-equipped agricultural departments in collegiate institutions capable of aiding the work of distinct groups of local authorities charged with the provision of technical education. The collegiate centres established by the several University colleges at Bangor, Leeds, Newcastle, and Aberystwyth had continued to develop and to extend their usefulness as centres of educational energy for the surrounding counties. Further centres had been fully equipped and new agricultural teaching organisations definitely set on foot, on lines more or less similar, at Cambridge, Nottingham, and Reading. In Scotland, where the institution of definite centres was being more slowly developed than in England, several of the south-western counties had continued to make use of the facilities for agricultural instruction offered by the central classes provided, and by the itinerant lecturers supplied for local work by the Glasgow and West of Scotland Technical College. Besides assisting institutions such as the Durham College of Science and the Glasgow Technical College, where lectures on certain forestry subjects were included in the general curriculum, the Board had again been able to repeat the grant towards the cost of the special forestry class established in the University of Edinburgh. An endeavour had been made to continue, although necessarily on a reduced scale, the assistance given to experimental work, and provision had also been made for experiment stations or demonstration plots at each of the Welsh colleges. A beginning in the same direction had been made at Reading. The grants awarded by the Board during the year range from £800, given to the University College of North Wales, at Bangor, the Yorkshire College, Leeds, and the Durham College of Science, Newcastle-on-Tyne, to £25 given to the Dounby Science School, Orkney. In all there were twenty grants, eight being for work in collegiate centres, five for agricultural experiments, three for dairy instruction, one for special cheese research and agricultural experiments, one for forestry work, and two for special classes.

SCIENTIFIC SERIALS.

American Journal of Science, September.—The effect of glaciation and of the glacial period on the present fauna of North America, by Samuel H. Scudder. Statistics of the number of genera and species found in the areas formerly covered by the ice-sheet and the driftless areas respectively, and of the number common to both, would indicate whether the northern fauna had recovered from the effects of glaciation. Tables are given showing this for the Coleoptera, as the best known among insects, which are very sensitive to climatic changes. The conclusion arrived at is that, on the whole, the fauna has nearly or quite recovered from its enforced removal from the Northern States and Canada.—Tertiary and later history of the island of Cuba, by Robert T. Hill. No positive evidences of subsidence after the beginning of Tertiary time could be discovered. Nowhere do the rivers show any revival or other evidence of subsidence below the sea-level, but all have continuous downward cutting sections. On the other hand, some of these streams are now forming delta deposits in places outside their mouths, which is more indicative of present elevation than of subsidence. Since the old folding or orogenic movements occupied at least a small portion of post-Tertiary time, we may reasonably conclude that the periods of uniform uplifting must have taken place at least since the beginning of the Pleistocene. In other words, they are comparatively modern in geologic time—some of them absolutely recent.—Thermoelectric heights of antimony and bismuth alloys, by C. C. Hutchins. The best combination for a thermo-junction from these alloys is, for one element, bismuth with from 2 to 5 per cent antimony; and for the other, bismuth with from 5 to 10 per cent. tin. They may be cast into thin leaves as follows: Two pieces of plate glass are smoked slightly, or are very finely ground, and rubbed with plumbago. The metal being melted upon charcoal or under fused sodium chloride, a little pool is formed upon one plate, and the other is applied to it as quickly as possible. Leaves thus obtained can be worked with a fine file as thin as 0·03 mm. and are sufficiently tough to stand ordinary treatment.—On the nitrogen content of California bitumen, by S. F. Peckham. Oils from the tunnels in Wheeler's cañon on the south side of the Sulphur Mountain yielded 1·1095 per cent. of nitrogen. These and other oils of this region issue from strata protected from infiltration of rain-water and accompanying oxygen by overlying formations.

Quarterly Journal of Microscopical Science, vol. xxxvi. part 3.—Prof. A. G. Bourne gives an exhaustive account of the structure of *Moniligaster grandis*; and adds a revision of the genus, including diagnoses of some new species. Some good coloured figures of the different species accompany Prof. Bourne's memoir.—Mr. E. W. Macbride has a review of Spengel's monograph on Balanoglossus, and criticises that author's views on the affinities of the Enteropneusta.—Under the name *Monocystis herculea*, Mr. W. C. Bosanquet gives a number of observations on the structure and life-history of a large Gregarine found in the earth-worm *Lumbricus herculeus*.

Wiedemann's Annalen der Physik und Chemie, No. 9.—On refractive power and density of dilute solutions, by W. Hallwachs. The increase in the difference of molecular refraction previously observed with increasing dilution is completely explained by the peculiar behaviour of the density. The constitutive influences analogous to dissociation, which find their most characteristic expression in the changes of electric conductivity, have no effect upon the refractive power.—On the motion of dielectric bodies in the homogeneous electrostatic field, by L. Graetz and L. Fomm. Mascart and Joubert, in their development of Poisson's original theory, assume that small bodies placed in a dielectric do not exert any forces upon each other. This is contradicted by experiments upon small bars and plates of dielectric materials introduced into homogeneous fields, which tend to turn their axes and planes respectively into a direction parallel to the lines of force. When the condenser plates are statically charged, the rotations depend upon the sign of the charge, but in the case of oscillations they are always in the same direction and proportional to the square of the difference of potential. A small disc, made of sulphur or paraffin, suspended between the plates may be used as a "dielectric voltmeter."—On electric oscillations of long duration and their effects, by H. Ebert. The author investigates the conditions of obtaining the best luminous effects of the type of those produced by Tesla. He points out that the secondary circuit must be tuned to the primary, and that the condensers must have the least possible capacity. He describes a "luminescence lamp" made of a glass globe containing a piece of luminous paint. Oscillations are conducted to tinfoil armatures on the globe, and produce vivid luminescence. The light effects were about one-thirtieth or one-fortieth of the amyl-acetate standard. The energy consumed counted by millionths of a watt, so that the economy of the new lamp is very striking, consuming as it does only about a two-thousandth of the energy consumed by the acetate lamp. The difficulty involved in the fact that the high frequency currents

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employed could not be conducted any distance without encountering enormous inductive resistances, could be got over by effecting the transformation in the immediate neighbourhood of the lamp. Since only condensers of small capacity and inductance are required, a transformer might be attached to the lamp itself.

SOCIETIES AND ACADEMIES.

London.

Royal Society, June 21.—"On the Evolution of the Vertebral Column of Fishes." By Dr. H. Gadow, F.R.S., and Miss E. C. Abbott.

The following are a few of the more important points in the paper:—Each skleromere lies within the influence or range of action of two successive myomeres. Taken as a whole, the skleromere is "interprotovertebral," more correctly bi-protovertebral, because it is composed of two successive sklerotomes, namely, the ventral half of one and the dorsal half of a second.

Consequently, the "resegmentation" or "neugliederung" is brought about in a manner fundamentally different to that hitherto supposed to have taken place. If A and B mean two successive sklerotomes, a and b their dorsal, α and β their respective ventral halves, then the new skleromere is composed of $b+\alpha$ and not of $\frac{A+B}{2}$.

The formation of a skleromere by the combination of alternating dorsal and ventral halves of sklerotomes explains also the presence of eight (four pairs) cartilaginous pieces, namely, basalia (so-called dorsal and ventral arches) and interbasalia (so-called intercalary pieces) for each complete segment.

Concerning the formation of centra or bodies of the vertebræ, we distinguish:—

I. *Chorda-centra*, *i.e.* centra cut out of the full of the chordal sheath, which itself has been strengthened by invasion of cartilaginous cells from the skeletogenous layer. Chorda-centra are possessed by all Elasmobranchs, potentially by Dipnoi and Holocephali.

II. *Arch-centra*, *i.e.* centra formed by the skeletogenous mass which remains entirely on the outside of the chordal sheath, which latter takes no share in their formation: osseous Ganoids and Teleostei.

Chorda-centra and arch-centra represent two different modes of development, each starting from an acentrous condition. This can be expressed as follows:—

Chordal sheath remaining entirely chordagenous.	Chordal sheath strengthened by invasion of skeletogenous cells, therefore with possibility of chorda-centra.
Cyclostomata. Cartilaginous Ganoids.	Dipnoi and Holocephali.
Formation of Centra.	
Osseous Ganoids, Teleostei.	Elasmobranchs.
ARCH-CENTRA.	CHORDA-CENTRA.

The formation of chorda-centra being independent of the arcualia explains how and why the number of "centra" does not necessarily agree either with that of the arcualia or with that of the trunk-segments, *e.g.* Hexanchus and tail of most other Elasmobranchs.

In *Amia calva*, the *postcentrum*, *i.e.* the posterior, archless disk of a complete tail-vertebra, is formed by the interdorsalia and interventralia of the same sklerotome, while the *precentrum*, *i.e.* the arch-bearing disk or anterior half is formed by the basidorsals of the same sklerotome and the basiventrals of the next previous sklerotome. The intermuscular septum runs obliquely across the precentrum, or, in other words, the precentra are bi-protovertebral or bi-myomeric, but not the postcentra.

In *Lepidosteus osseus* the combination of parts into one vertebral complex is superior to that of Amia, because each vertebra belongs, with its entire anterior half, to one, and with its posterior half to the next following myomere. The vertebræ are now truly bi-protovertebral or bi-myomeric.

Paris.

Academy of Sciences, September 10.—M. Lœwy in the chair.—Truffles (*Terfâs*) from Tunis and Tripoli, by M. Ad. Chatin. Truffles have been received by the author from Tunis belonging to the species *Terfezia Claveryi*. They seem always to occur in company with a herb called by the natives *Arong-Terfess*, which is *Helianthemum sessiliflorum*, Pers. (*Cistus sessiliflorus*, Desf.). Truffles similarly received from Tripoli are classed as *Terfezia Boudieri*.—On the equations of mechanics, by M. Wladimir de Tannenberg.—On Pfaff's problem, by M. A. J. Stodolkievitz.—On another determination of the circle derived from seven right lines and on some of its applications, by M. Paul Serret.—On Diptera harmful to cereals; observations from the Paris Entomological Station in 1894, by M. Paul Marchal. *Cecidomya destructor* (Say) has been very prevalent among wheat in the West. Oats have hitherto been considered proof against Hessian fly, but a form of Cecidomya has ravaged large districts in 1894. It remains to be seen whether this fly is a new species or only a variety of *Cecidomya destructor* modified by the difference of food. Other pests noted which have caused serious damage are the following: *Cecidomya* (*Diplosis*), *tritici* (Kirb.), *Oscinis pusilla* (Meig.), *Camarota flavitarsis* (Meig.), which has not heretofore been considered as injurious to cereals, and *Elachiptera cornuta* (Meig.).—On the recent fall of aeroliths in Greece, by M. C. Maltézos.

BOOKS, PAMPHLETS, and SERIALS RECEIVED.

Books.—An Introduction to Physical Measurements: Dr. F. Kohlrausch, translated by Waller and Procter, 3rd edition (Churchill).—A Naturalist on the Prowl: "Eha" (Thacker).—Primer of Hygiene: Dr. E. S. Reynolds (Macmillan).—Elements of Marine Surveying: Rev. J. L. Robinson, 2nd edition (Macmillan).—Theophrastus of Eresus on Winds and on Weather Signs, translated, &c., by J. G. Wood (Stanford).—Missouri Botanical Garden, Fifth Annual Report (St. Louis).—Municipal Technical School and Municipal School of Art, Manchester, Session 1894-5, Syllabus (Manchester).—The Earth: E. W. Small (Methuen).

Pamphlets.—Creameries and Infectious Diseases: Dr. J. J. Welpley (Baillière).—The Cretaceous Rim of the Black Hills: L. F. Ward (Chicago).—Principes et Méthodes d'Étude de Corrélation Géologique au Moyen des Plantes Fossiles: L. F. Ward (Chicago).

Serials.—Proceedings of the Society for Psychical Research, Part xxvi. Vol. x. (K. Paul). Botanische Jahrbücher für Systematik, Pflanzengeschichte und Pflanzengeographie, Achtzehnter Band, 5 Heft and Neunzehnter Band, 2 and 3 Heft (Leipzig, Engelmann).—Journal of State Medicine, August (Renshaw).—Journal of the Franklin Institute, September (Philadelphia).—Museum d'Histoire Naturelle des Pays Bas, tome xiv. Catalogue-systematique, &c.: F. A. Jentink (Leide, Brill).—Quarterly Journal of Microscopical Science, August (Churchill).—Proceedings of the Academy of Natural Sciences of Philadelphia, 1894, Part 1 (Philadelphia).—Insect Life, Vol. vi. No. 4 (Washington).—Journal of the Royal Horticultural Society, Vol. xvii. Parts 1 and 2 (117 Victoria Street).—Psychological Review September (Macmillan).—Abstract of the Proceedings of the Linnean Society of New York for the Year ending March 27, 1894, No. 6 (New York).—American Historical Register, No. 1 (Philadelphia).—Economic Journal, September (Macmillan).

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